

Armed Forces College of Medicine

AFCM



Pathology of Joint Diseases

Lecture Plan



1. Part 1 (5 min) Introduction
2. Part 2 (35 min) Main lecture
3. Part 3 (5 min) Summary
4. Lecture Quiz (5 min)

INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to

1. **List types and causes of arthritis.**
2. **Discuss pathology of acute suppurative arthritis**
3. **Mention the pathogenesis of rheumatoid arthritis**
4. **Describe articular lesions of rheumatoid arthritis.**
5. **List extra-articular lesions of rheumatoid arthritis.**
6. **List causes of osteoarthritis**
7. **Explain pathology of osteoarthritis.**
8. **Mention etiology of gouty arthritis**

Arthritis



Definition of arthritis:

It is inflammation of the joints.

Types:

Acute

1. Suppurative
2. Traumatic
3. Rheumatic
4. Viral
5. Acute gouty arthritis

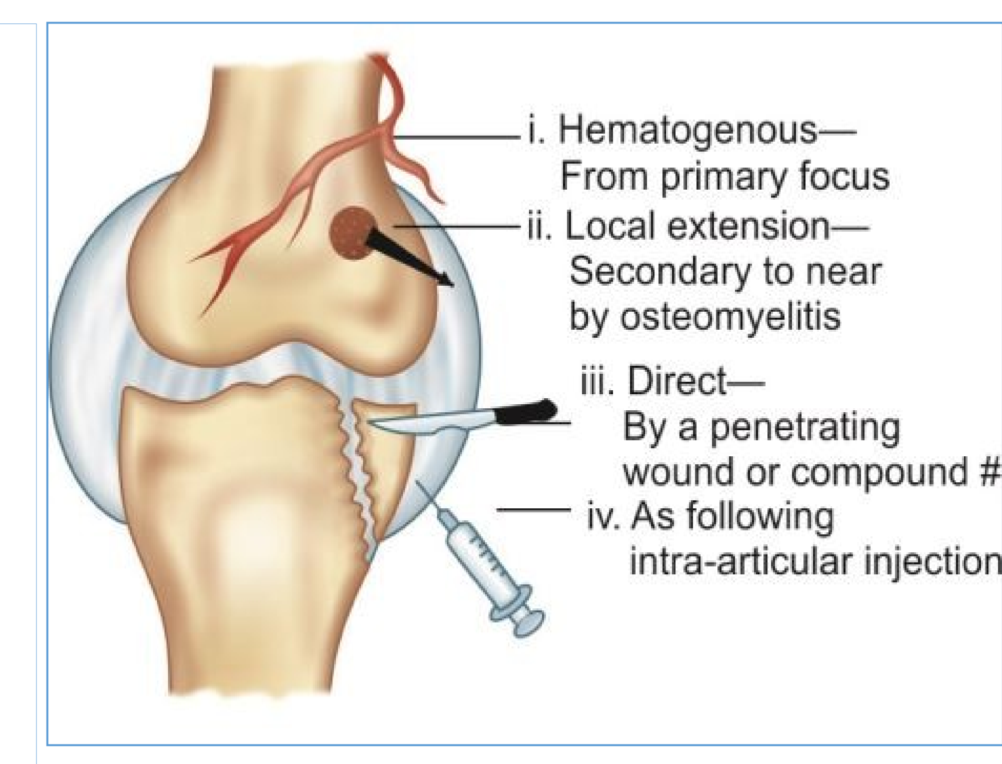
Chronic

1. Osteoarthritis
2. Rheumatoid arthritis
3. Chronic gouty arthritis
4. Tuberculous arthritis (general pathology)
5. Syphilitic arthritis
6. Hemophilic arthritis

Acute suppurative arthritis



- **Definition :** Acute inflammation that commonly involves a single large joint e.g: hip or knee
- **Organism**: staph. Aureus, less commonly strepyococci
- **Route of infection:**
  - Direct from osteomyelitis
  - Penetrating injuries
  - Blood borne



https://jaypeedigital.com/book/9789350251096/chapter/ch4

Acute suppurative arthritis



❖**Clinically:**

Joint is swollen (with pus), red, hot and tender with marked restriction of movement

❖**Pathology:**

- Suppurative inflammation of joint space and the surrounding soft tissue
- Destruction of articular cartilage healing by fibrosis fibrous ankylosing



Rheumatoid arthritis



❖**Autoimmune** collagen disease, more common in females between 30-50 years.

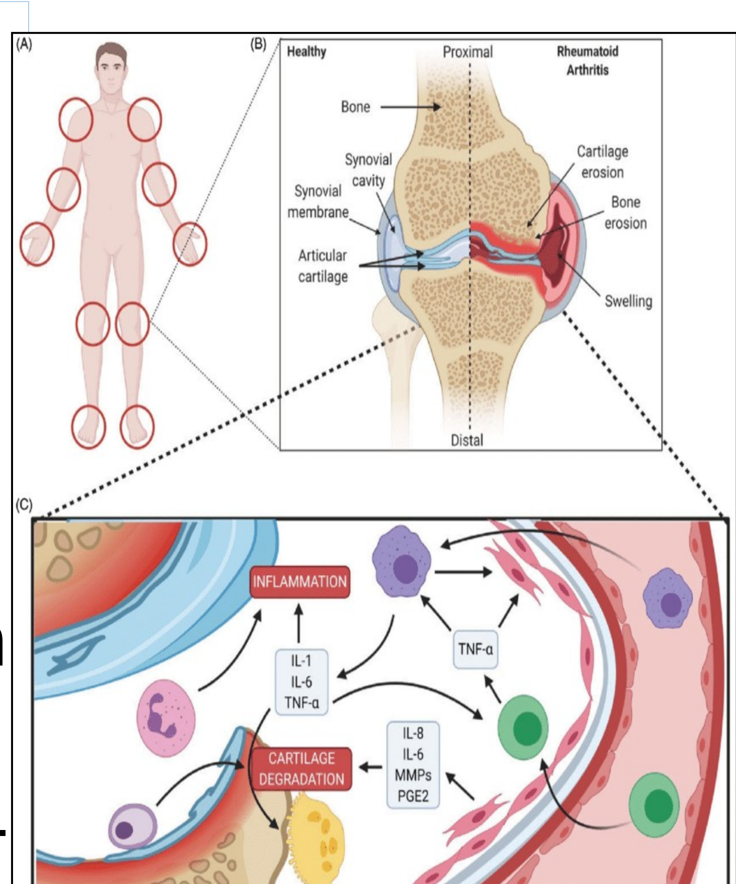
❖**Pathology:**

1- Articular

2- Extraarticular

❖**PATHOGENESIS:**

- An autoimmune mechanism of unknown stimulus
- Autoantibodies are liberated-->inflammatory reaction.-------> **cytokines** as **TNF** & **interleukins** as well as **enzymes** as **proteases** **destruction of joint structures**



Rheumatoid arthritis



PATHOLOGY: ***1- Articular (joint) lesions***

- Polyarthritis
- Involving mainly small joints of hands and feet
- Symmetrical involvement
- The involved joints are swollen, painful and stiff



https://en.wikipedia.org/wiki/Rheumatoid_arthritis#/media/File:Rheumatoi



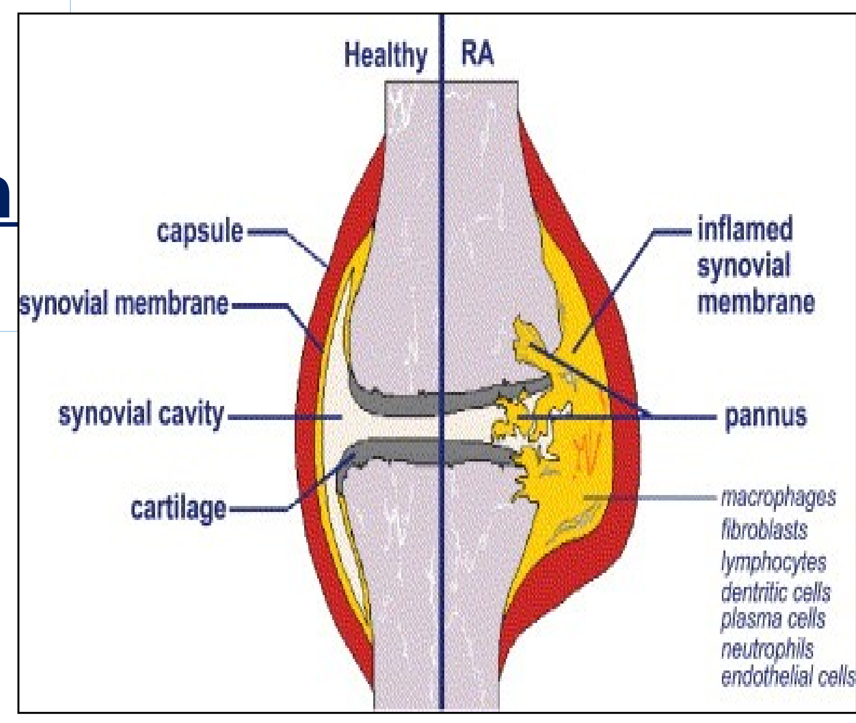
https://www.docwirenews.com/home-page-editor-picks/what-aggravates-rheuma

Rheumatoid arthritis



PATHOLOGY: 1- Articular (joint) lesions

A. **Chronic inflammation of the synovial membrane:**



https://www.sciencedirect.com/science/article/abs/pii/S0009898104003

Rheumatoid arthritis



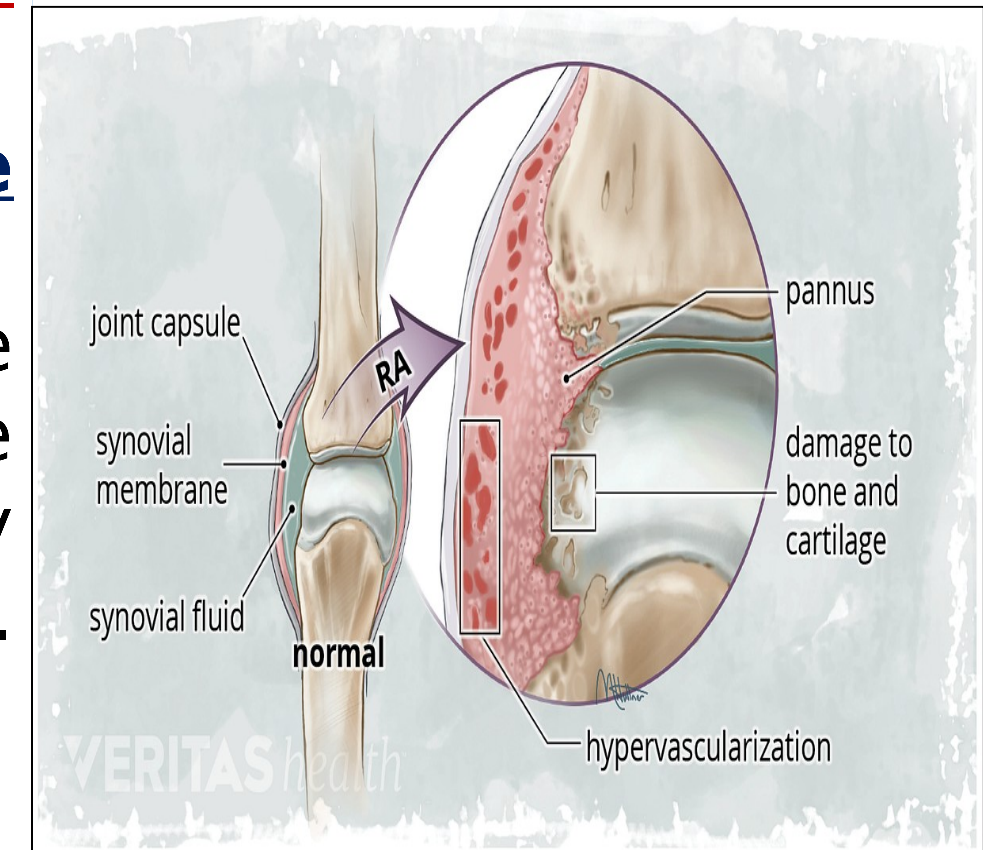
PATHOLOGY: *1- Articular (joint) lesions*

B. Excessive granulation tissue formation

- Creeps under the articular cartilage within the eroded bone, and over the articular cartilage and may communicate on both surfaces. **(Pannus)**

C. Articular cartilage is destroyed

---> healing by fibrosis--> **fibrous ankylosing** ---> **bony ankylosing** ---> the joint becomes **deformed**



Rheumatoid arthritis



IOLOGY: 1- Articular (joint) lesions

Stages of Rheumatoid Arthritis

Healthy Joint
1. Synovitis
2. Pannus
3. Fibrous Ankylosis
4. Bony Ankylosis

Cartilage
Bones
Fibrous capsule
Synovial membrane
Joint cavity with synovial fluid

Synovial membrane inflamed and thickened
Bones and cartilage gradually eroded

Pannus
Excessive cartilage loss; exposed and pitted bones

Joint invaded by fibrous connective tissue

Bones fused

DRJOCKERS.COM
SUPERCHARGE YOUR HEALTH

https://www.himaayush.com/blog/arthritis/types-of-arthritis/

RHEUMATOID ARTHRITIS



PATHOLOGY: ***2- Extra-articular lesions***

a) **Rheumatoid nodules**:
Mainly develop **subcutaneously** over **bony prominences**



https://www.pcds.org.uk/clinical-guidance/rheumatoid-nodules



RHEUMATOID ARTHRITIS



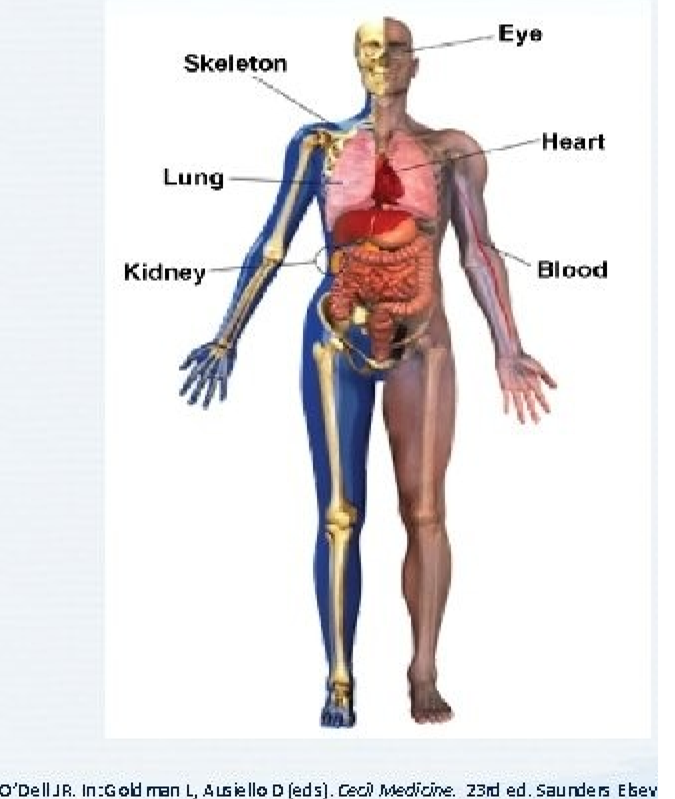
PATHOLOGY: ***2- Extra-articular lesions***

b) Heart lesions:
Rheumatoid nodules affecting the valves and pericardium.

c) Vascular lesions: Arteritis.

d) Lymphoid hyperplasia and enlargement of lymph nodes and spleen.

e) Amyloidosis may sometimes occur.



https://slidetodoc.com/assessment-and-diagnosis-overview-treating-underlying-causes-of/

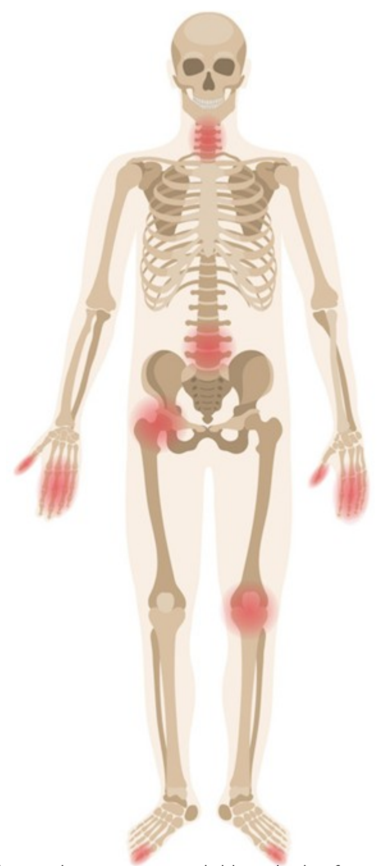
Osteoarthritis (OA)



- (OA)is a common **degenerative disease** characterized by primary abnormalities in the articular cartilage of **weight bearing joints** (knee, hip and spines are the most common sites).

Types:

1. Primary (95%) affects old females > males (wear & tear joints)
2. Secondary (5%) affects any age



https://curearthritis.org/what-is-the-difference-between-osteoarthritis-and-other-forms-of-autoimmune-arthritis-such-as-rheumatoid-arthritis/

Osteoarthritis (OA)



2. <u>Secondary Osteoarthritis:</u> It can affect any age

A. <u>Chronic joint stress</u>

e.g. due to obesity and occupational strains.

B. <u>Abnormal joint mechanics</u> e.g.

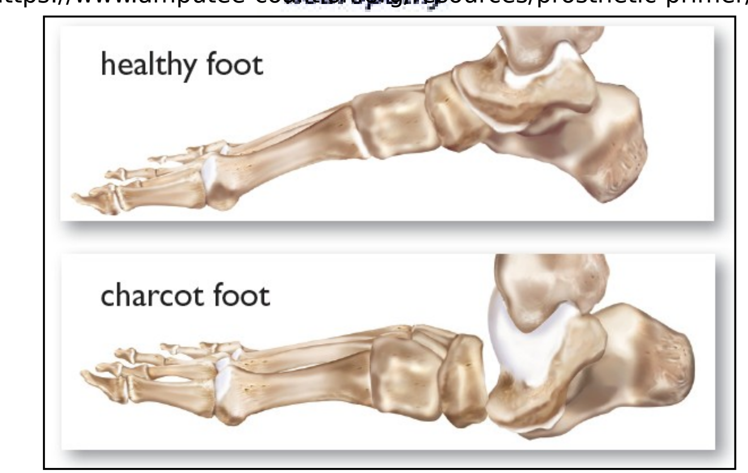
- Defective nerve supply to a joint Congenital joint deformities
- Acquired joint deformities e.g post-traumatic

C. <u>Systemic disease (helping factors)</u> : as diabetes mellitus



Deformity of both feet from collapse of the midfoot arch due to Charcot neuropathic arthropathy -in this case in a patient with alcoholic peripheral neuropathy

https://www.amputee-coalition.org/resources/prosthetic-primer/



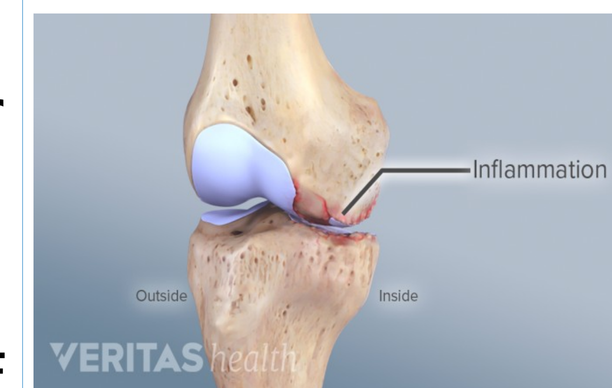
https://capfootandankle.com/charcot-foot/

Osteoarthritis (OA)



1.Articular cartilage & bone lesions:

- **Degeneration** and **softening** of articular cartilage then **disappears** and the underlying bone is exposed.
- Proliferation of the peripheral parts of cartilage occur ---> **cartilaginous lipping** ---> Ossification of these lipping leads to **bony projections (osteophytes)**
- Separated portions of degenerated cartilage may float freely in the joint **(joint mice)**
- The underlying bone undergoes **progressive eburnation**.





Osteoarthritis (OA)



Normal knee

Cartilage

Fibula

Tibia

Arthrosis of the knee

Cartilage injury

Bone exposure

Eburnation

Erosion of cartilage

Osteophytes

Ca **osteophytes** ng

Fragments of cartilage

Joint mice

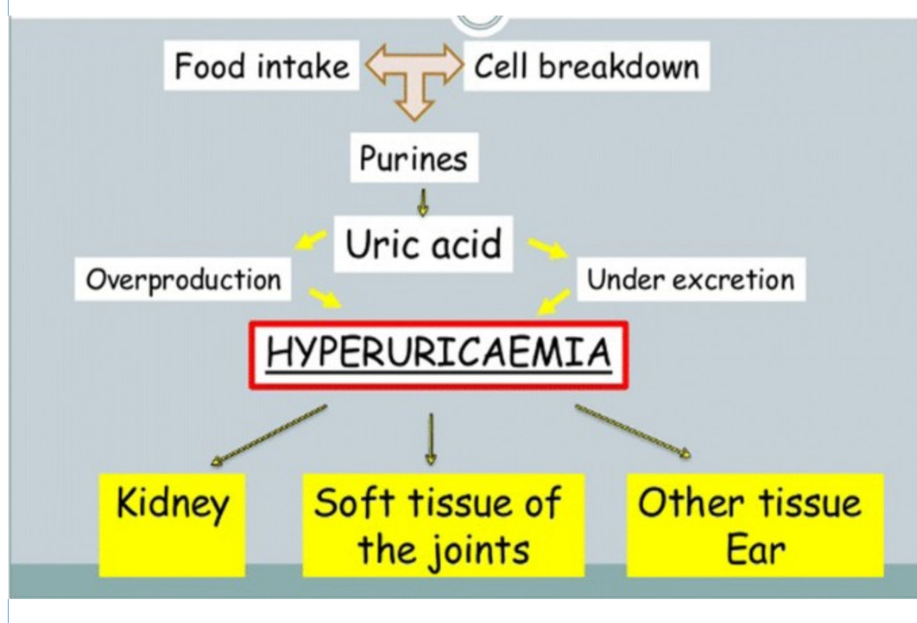
Gouty arthritis



Etiology:

Disturbance in **purine metabolism** ---> increase in serum uric acid ---> deposition of sodium urate crystals in tissues

1. **Primary gout**: (known or unknown enzyme defect)heridetary predisposition
2. **Secondary gout**: Due to excess nucleoprotein destruction as in chronic myeloid leukaemia



https://www.researchgate.net/figure/Flow-chart-of-GOUT-pathophysiology_

Gouty arthritis

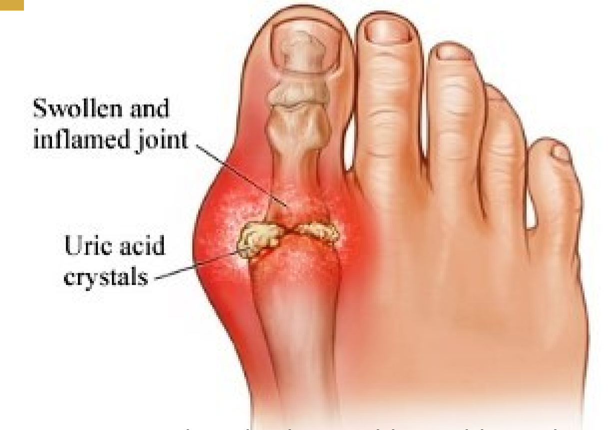


Pathology:

1. Increase serum uric acid (hyperuricaemia)
2. Monosodium urate crystals (MSU)deposition --->

a. **Acute arthritis**: particularly the **big toe** ---> severley inflamed with dense neutrophilic infiltration

b. **Chronic tophaceous arthritis**: excess deposition of **MSU** crystals in cartilage and synovium ---> chronic inflammation and fibrosis ---> joint ankylosing



https://www.optimaphysio.com/blog/evidence-based-physiotherapy-for-gou



Gouty arthritis

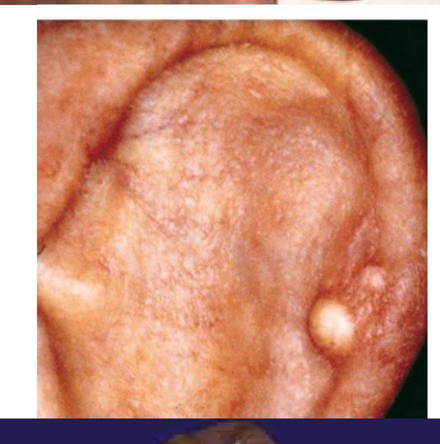


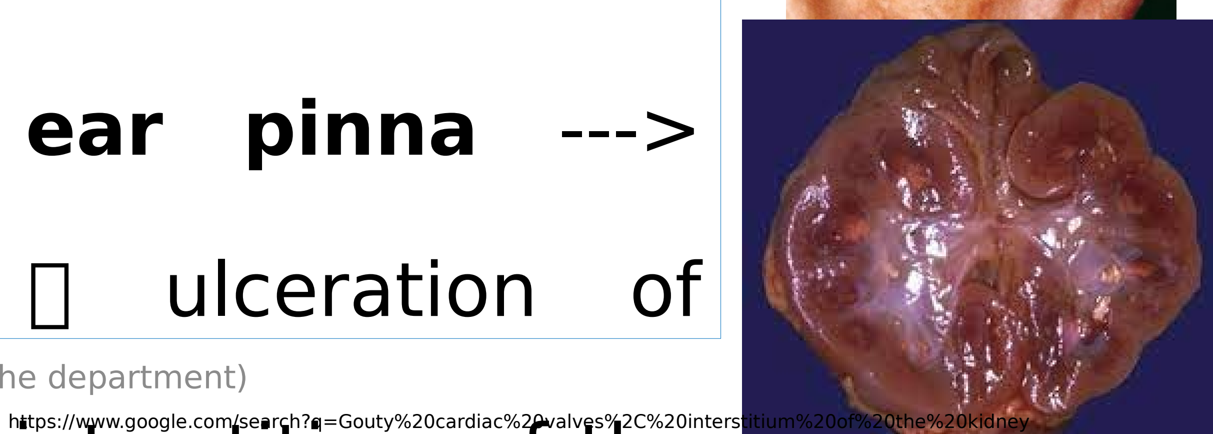
C.Tophi:

- **Gross**: Small nodular lesions with chalky white color
- **Structure**: Aggregates of urate crystals
- **Microscopic**:
  Amorphous material surrounded by chronic granulomatous reaction rich in giant cells (foreign body granuloma)
- **Sites**: appear in

1. **Joint structures**
2. **Cartilage of nose and ear pinna** ---> ulceration of overlying skin
3. **Subcutaneous (eyelids**) → ulceration of overlying skin
4. **Other sites:** cardiac valves







https://www.google.com/search?q=Gouty%20cardiac%20valves%2C%20interstitium%20of%20the%20kidney

Gouty arthritis



Inflamed joint

Swelling

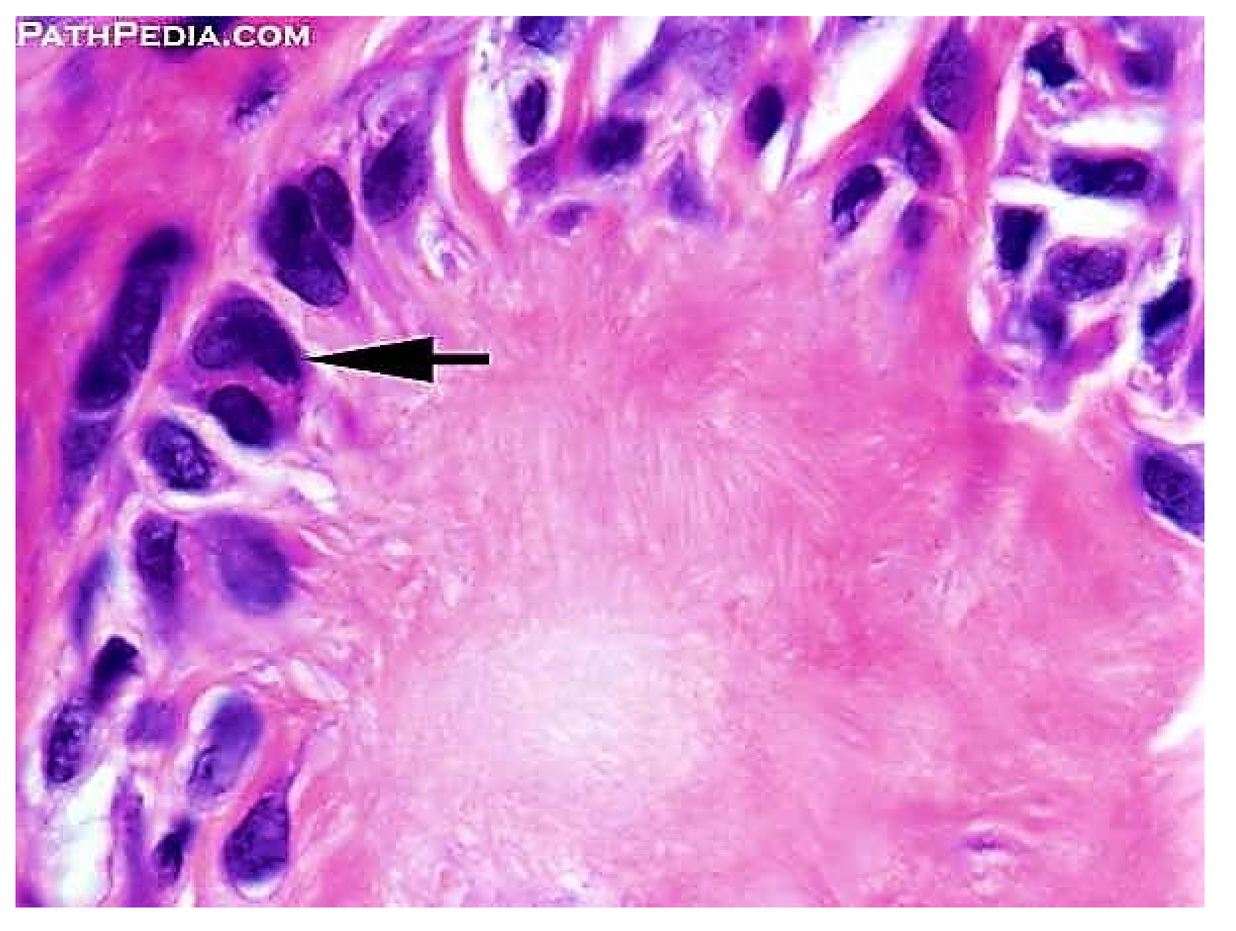
Uric acid crystals

Tophus

Gouty arthritis







Gouty arthritis



D. Gouty nephropathy:

- ❖Tophi in the interstitial tissue of the kidney
- ❖Uric acid/ urate stones in the renal pelvis and calyces
- ❖Renal failure may occur



https://www.wikidoc.org/index.php/File:Gout_0033.jpg

Quiz



Rheumatoid arthritis is characterized by all of the following, Except:

a. Affection of small joints
b. Fibrinoid type necrosis of the synovium
c. Creeping granulation tissue formation in the joint space
d. Small nodules over the ear pinna and eyelids with ulcerated covering skin
e. Subcutaneous nodules over the elbow joint

Quiz



A 60 years old, obese, female patient, complaining of bilateral knee pains that increases with walking, started few years ago in a progressive fashion. What do you expect to find in her knee joint:

A. A creeping granulation tissue
B. A chalky white nodular lesions
C. Cartilagenous lippings that later ossifiy
D. Synovial membrane necrosis
E. Pus

SUGGESTED TEXTBOOKS



1. Robbins basic pathology, ninth Edition
2. Kaplan step 1 pathology lecture notes 2017 (P.78-98)